

DEC 19 1994

1684



15 December 1994

Ms. Marjory Brown  
P.O. Box 598  
St. Johnsbury, VT 05819

Dear Ms. Brown:

Please find enclosed a copy of our initial site investigation report for the former Brown Electric facility, located at 148 Portland Street in St. Johnsbury, Vermont. As we discussed, we are forwarding copies of the report to the Vermont Department of Environmental Conservation and to Mr. Mark Bertolini.

Ground Water of Vermont appreciates the opportunity to assist you with this work. Please give me a call if you have any questions or comments.

Sincerely,

A handwritten signature in cursive script, appearing to read "Ron Miller".

Ron Miller  
Hydrogeologist and Regional Manager

Enclosure

cc. ✓ Mr. Richard Spiese, VT DEC  
Mr. Mark Bertolini

RWM/rm 94054L04.SAM

**INITIAL SITE INVESTIGATION REPORT**

**Former Brown Electric  
148 Portland Street  
St. Johnsbury, Vermont**

**VT DEC Site #94-1684**

**14 December 1994**

Prepared for:

Marjory Brown  
P.O. Box 598  
St. Johnsbury, Vermont 05819

Prepared by:

**Ground Water of Vermont**  
1 Mill Street, Box C-5  
Burlington, Vermont  
(802) 860-6065

GWV Document 94054R01.SAM

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## EXECUTIVE SUMMARY

Ground Water of Vermont (GWV) has conducted an initial site investigation at the former Brown Electric property in St. Johnsbury, Vermont to evaluate the degree and extent of soil and ground water petroleum contamination in the vicinity of a former 550-gallon heating oil underground storage tank (UST). The soil contamination appears to be limited in degree and extent, and does not appear to pose a significant threat to nearby potential receptors. Two 1,000-gallon gasoline USTs, located in a different part of the property and removed at the same time as the heating-oil UST, were not investigated because field-screening and laboratory results indicated that all contaminated soils near these USTs were removed. Laboratory analysis on ground water samples collected from the site did not detect petroleum compounds. However, because soils in the heating-oil UST pit exceeded Vermont guideline standards, GWV recommends that the wells at the site be monitored for petroleum compounds on a quarterly basis for one year.

The subsurface investigation consisted of the installation, sampling, and analysis of four soil boring/monitoring wells in the vicinity of the removed UST on the northern portion of the property. Soil samples were collected from the borings and screened using a photoionization detector (PID). Relative ground water elevations were measured to determine ground water flow direction and gradient. Water samples collected from the monitoring wells were analyzed for volatile organic compounds (VOCs) by EPA Method 8020, and for Total Petroleum Hydrocarbons (TPH) by EPA Method 418.1.

Soils encountered during subsurface explorations consisted of coarse-to-medium sand and gravel, underlain by fine sand and silt. Bedrock was encountered during the installation of the two downgradient monitoring wells, at a depths of 16 to 17 feet below ground surface. Ground water in the immediate vicinity of the monitoring wells was encountered at a depth of 6.3 to 12.4 feet below ground surface, and was flowing toward the west at a 14% gradient.

Although approximately 35 cubic yards of oil-saturated soils were removed from the heating oil UST pit, petroleum compounds in the excavation limits remained above the Vermont guideline standards. Petroleum compound levels were at or below guideline standards in the two borings located downgradient and the one boring upgradient of the former UST. Although ground water observed in the excavation indicated the presence of petroleum contamination, no petroleum compounds were detected in the analyses of ground water samples collected from the monitoring well located in the tank pit, or from the three surrounding monitoring wells.

Sensitive receptors identified were the on-site building and the Moose River. The location of these receptors and the low levels of contamination at the site indicate that it is unlikely that any receptors will be impacted.

The remaining low levels of in-situ soil contamination at the site will likely decrease over time through the processes of degradation, dilution, and dispersion. No additional remediation appears to be warranted at this time.

## 1.0 INTRODUCTION

This report details the findings of a site investigation conducted at the Former Brown Electric building in St. Johnsbury, Vermont. The report has been prepared by Ground Water of Vermont (GWV) for Marjory Brown.

Soil and ground water contamination were detected during removal of a heating-oil underground storage tank from the property on 19 and 20 September 1994. The site investigation has been conducted in accordance with the "expressway" process described in the State of Vermont Department of Environmental Conservation (VT DEC) Guidance Documents to Evaluate and Remediate Hazardous Waste Sites.

On 10 October 1994, Marjory Brown retained the services of Ground Water of Vermont to perform this work.

### 1.1 Scope of Work

To accomplish the investigation objectives, GWV has performed the following:

- Reviewed existing data on the site;
- Supervised the installation of one backhoe well and three drilled soil boring/monitoring wells on the property;
- Determined ground water flow direction and gradient;
- Collected and submitted for laboratory analysis ground water samples from the monitoring wells;
- Identified potential receptors of the contamination;
- Assessed the risk that the contamination poses to these potential receptors;
- Evaluated the need for treatment and/or long-term monitoring at the site; and
- Prepared this summary report, which details the work performed and provides conclusions and recommendations.

### 1.2 Site Location and Physical Setting

The site is located on the outer edge of the City of St. Johnsbury, Vermont, on the northwest corner of the intersection of Portland Street (U.S. Route 2) and Assiqua Avenue. The west side of the property is bordered by the Moose River (see Figure 1, Site Location Map). A residence borders the site to the north. The on-site building, formerly Brown Electric, is currently vacant (see Figure 2, Site Plan). The area surrounding the site is commercial/residential.

The site is located at the top of a steep bank that slopes downward to the Moose River. The site topography is flat. Surface run-off flows to a drainage swale located north of the property, or to stormwater drains along Portland Street.

## 2.0 SITE HISTORY

The on-site building was used as a retail gasoline service station until approximately 1974. From approximately 1974 to 1992, the site was used for the office of Brown Electric, an electrical contracting firm. The site has been unused since 1992.

Three underground storage tanks (USTs) were present on the property. Two of the USTs were 1,000-gallon out-of-service, unregistered gasoline USTs and were located south of the building. The gasoline USTs had reportedly been taken out of service when the gas station closed in 1974. The third UST, a 550-gallon out-of-service, unregistered heating oil tank, was located north of building. The age of the USTs is unknown.

On 19 and 20 September 1994, all three USTs were removed by Calkins Excavating of Danville, Vermont with oversight by Ground Water of Vermont personnel. One of the gasoline USTs had apparently leaked from a hole in the UST bottom. The second gasoline UST did not appear to have leaked. The heating oil UST was perforated with several holes and also appeared to have leaked.

Soil contamination was noted during the removal of the gasoline USTs on the south side of the property, as well as during the removal of the heating oil UST on the north side of the property. The soil contamination in the vicinity of the gasoline USTs was limited in extent, and all of the contaminated soils (approximately 25 cubic yards) were removed and stockpiled. These soils were subsequently transported from the site to MTS, Inc. in Epsom, New Hampshire, where they were treated by asphalt-batching. Photoionization detector (PID) screening and laboratory analyses of soil samples collected from the excavation limits indicated that all soils contaminated above Vermont guideline standards were removed from the vicinity of the gasoline USTs.

Excavation of all contaminated soils in the vicinity of the heating oil UST was not considered feasible, due to the presence of ground water in the tank pit and the apparently greater lateral extent of contamination in this area. Ground water was encountered at approximately seven feet below ground surface, and was described as having heavy sheens and free-phase petroleum globules. Approximately 35 cubic yards of oil-saturated soils were removed from this area and stockpiled on-site, pending soil analyses and transport to MTS for asphalt-batching. The UST excavation was backfilled with clean sand fill.

### **3.0 INVESTIGATIVE PROCEDURES AND RESULTS**

#### **3.1 Soil Boring/Monitoring Wells**

On 20 September 1994, one monitoring well (MW-1) was installed in the heating oil UST pit to evaluate the degree of ground water contamination in the source area. On 14 October 1994, GWV supervised the installation of three additional soil boring/monitoring wells (MW-2 - MW-4) in the vicinity of the former heating-oil UST. Approximate boring locations are shown on Figure 2. Boring logs are presented in Appendix B. The additional soil boring/monitoring wells were installed by Tri-State Drilling and Boring of West Burke, Vermont, using a hollow-stem auger drill rig with 4.25-inch diameter augers.

The soil borings encountered approximately 8 feet of coarse-to-medium sand and gravel, underlain by fine sand and silt to a depth of approximately 11-17 feet below ground surface. Bedrock was encountered at 16-17 feet below ground surface in the two downgradient (MW-3 and MW-4) borings.

Monitoring wells were installed in all of the borings. The wells were developed using an air-lift pump provided by the driller. Monitoring well construction logs are presented in Appendix B.

#### **3.2 Soil Screening Results**

On 20 September 1994, soils from the limits of excavation in the heating-oil UST pit (into which MW-1 was placed) were sampled and screened in the field for volatile organic compounds (VOCs) with a Photovac TIP II PID. The PID was calibrated with isobutylene gas to a benzene reference. Soil screening results are shown in Table 1. PID readings in this area ranged from 16.4 to 130 parts per million (ppm); these results suggest that soils in the vicinity of the tank pit remain contaminated above the Vermont PID-based guideline standard of 10 ppm for fuel-oil contaminated soil.

The screening results of split-spoon soil samples collected at five-foot intervals from the upgradient and downgradient borings indicated that soils in these areas were at or below the Vermont guideline standard. PID screening results are presented in Table 1. PID readings in MW-2, MW-3, and MW-4 ranged from 3.8 to 10.1 ppm. No odors were observed by the GWV personnel conducting the field screening. High organic content in the soils may account for the slightly elevated PID readings.

#### **3.3 Determination of Ground Water Flow Direction and Gradient**

On 24 October 1994, ground water in the surficial aquifer in the vicinity of the monitoring wells was determined to be flowing toward the west at an approximate gradient of 14%. The depth to ground water was between 6 and 12.5 feet below ground surface. Relative water table elevations in the monitoring wells were determined by subtracting the measured depth-to-water in each well from a surveyed top-of-casing relative elevation. Water level measurements and

elevation calculations are presented in Table 2. A ground water contour map (see Figure 3) was prepared using this data.

### 3.4 Ground Water Sampling and Analysis

Ground water samples were collected from all of the monitoring wells and analyzed for petroleum constituents. No contaminants were detected in any of the samples. Analytical results are summarized in Table 3. Laboratory report forms are included in Appendix C.

Ground water sampling was conducted on 24 October 1994, and followed GWV's Ground Water Sampling Protocol. The water samples were submitted to an analytical laboratory, where they were tested for the EPA Method 8020 list of volatile petroleum compounds by EPA Method 8260, and for Total Petroleum Hydrocarbons (TPH) by EPA Method 418.1. GWV collected a trip blank, an equipment blank, and a duplicate sample (of MW-1) to verify proper quality assurance and quality control (QA/QC), as required by the Vermont DEC.

The absence of detectable levels of petroleum compounds in ground water at the former UST location was unexpected, since visible evidence of contamination had been noted on the water in the UST pit during removal. Although removal of the bulk of oil-saturated soils from the UST pit reduced the volume of contaminated soils, PID screening results suggest that some contamination remained at or below the water table surface. One explanation for this discrepancy is that the 35 cubic yards of clean fill around MW-1 may have temporarily reduced contaminant levels in the well by adsorbing contaminants. Even if this is the case, however, it is considered unlikely that contaminant levels in future samples would exceed Vermont ground water enforcement standards.

Analytical results from the QA/QC samples indicate that adequate QA/QC was maintained during sample collection and analysis. No petroleum compounds were detected in the trip blank or equipment blank samples, and reported concentrations for the duplicate sample were the same as the original sample.

## 4.0 RECEPTOR SURVEY AND RISK ASSESSMENT

### 4.1 Receptor Survey

Ground Water of Vermont performed a limited survey of the area to identify potential receptors in the area of the contamination. Potential receptors identified include the on-site building and the Moose River.

The on-site building is located approximately 10 feet southwest of the former UST location. The Moose River is approximately 75 feet west of the former UST location. No drinking water supply wells are located between the former UST location and the Moose River. According to well completion records on file at the VT DEC, five water supply wells are located with one-half mile of the site. The closest recorded well is a 190-foot deep bedrock well located approximately 2,000 feet southwest of the site. Municipal water is available in the area and is reportedly used by the on-site building and all buildings and residences surrounding the site.

### 4.2 Risk Assessment

On the basis of the findings reached during this investigation, GWV has qualitatively evaluated the risks that the contamination at the site poses to potential receptors. Home heating oil contains several compounds that are hazardous to human and animal health, including one (benzene) that is listed by the U.S. Environmental Protection Agency (EPA) as a known human carcinogen. The most common routes of exposure include ingestion of compounds that have migrated to drinking water supplies and inhalation of vapors that have migrated into buildings.

The risk of ingestion of petroleum compounds due to potential contamination of drinking water supplies does not appear to be significant. Laboratory analysis of ground water samples collected from the on-site monitoring wells indicate that levels of regulated petroleum compounds are below Vermont drinking water standards. In addition, the closest recorded drinking water supply is located 2,000 feet in the upgradient direction from the site.

The risk of petroleum vapor inhalation also does not appear to be significant. The on-site building is located in the upgradient direction from the former heating-oil UST location and does not contain a basement. It is thus unlikely that the building will be impacted by petroleum vapor migration.

The final discharge point of ground water in the surficial aquifer is probably the Moose River. Because fuel oil compounds can also impact surface water bodies and water-dwelling organisms, the risk to the Moose River was assessed. The absence of detectable levels of VOCs or TPH in all of the on-site monitoring wells and the relatively low expected hydraulic conductivities through the fine sand and silt soils in the surficial aquifer at the site suggest that the natural processes of dilution, dispersion, and degradation will any reduce petroleum compound concentrations in ground water to below detectable levels prior to discharge.

## 5.0 CONCLUSIONS

On the basis of the above-described investigation, Ground Water of Vermont has concluded the following:

1. There have been releases of petroleum to the subsurface at the site, both from a former heating oil UST and from a gasoline UST on the site.
2. The apparent sources of contamination were removed from the ground on 19 and 20 September 1994, and were not replaced.
3. Soils in the vicinity of one of the gasoline USTs were impacted by a release or releases from the UST. However, PID screening results and laboratory analyses indicate that all soils containing gasoline contamination above Vermont guideline standards (approximately 25 cubic yards) were removed from the ground. The excavated soils were transported from the site for treatment by asphalt-batching.
4. Ground water in the vicinity of the gasoline USTs does not appear to have been impacted by releases from these USTs. Downward vertical migration of contaminants was apparently retarded by an organic-rich peat soil layer.
5. Soils in the immediate vicinity of the heating-oil UST location were impacted by the release from this UST. Approximately 35 yards of oil-saturated soils were removed and transported from the site for asphalt-batching. Removal of all of the contaminated soils was not considered feasible. PID screening of soil samples collected from the excavation limits indicated that soils in the immediate vicinity of the UST pit remained contaminated above the Vermont guideline standard for fuel-oil contaminated soils.
6. PID screening results of soil samples collected from three soil borings at the site indicate that soil contaminant levels upgradient and downgradient from the heating-oil UST are at or below the PID-based Vermont guideline standard for soils contaminated with fuel oil. No petroleum odors were noted in any of the soil samples from the soil borings, suggesting that the elevated PID readings may be due to naturally occurring compounds in the soils.
7. Although heavy sheens and globules of free product were noted on the ground water during the heating-oil UST removal, no petroleum compounds were detected in any of the on-site monitoring wells. Petroleum contamination may have been greatly decreased as a result of the removal of oil-saturated soils from the UST pit. Ground water quality in MW-1, located in the UST pit, may also have been temporarily affected by the backfilling of clean fill around the well.
8. The remaining soil contamination at the site appears to be limited in degree and extent, and does not appear to pose a significant threat to any potential receptors. Dilution, dispersion, and degradation will likely decrease any ground water contaminants that may be present to below detectable levels prior to discharge to the Moose River.

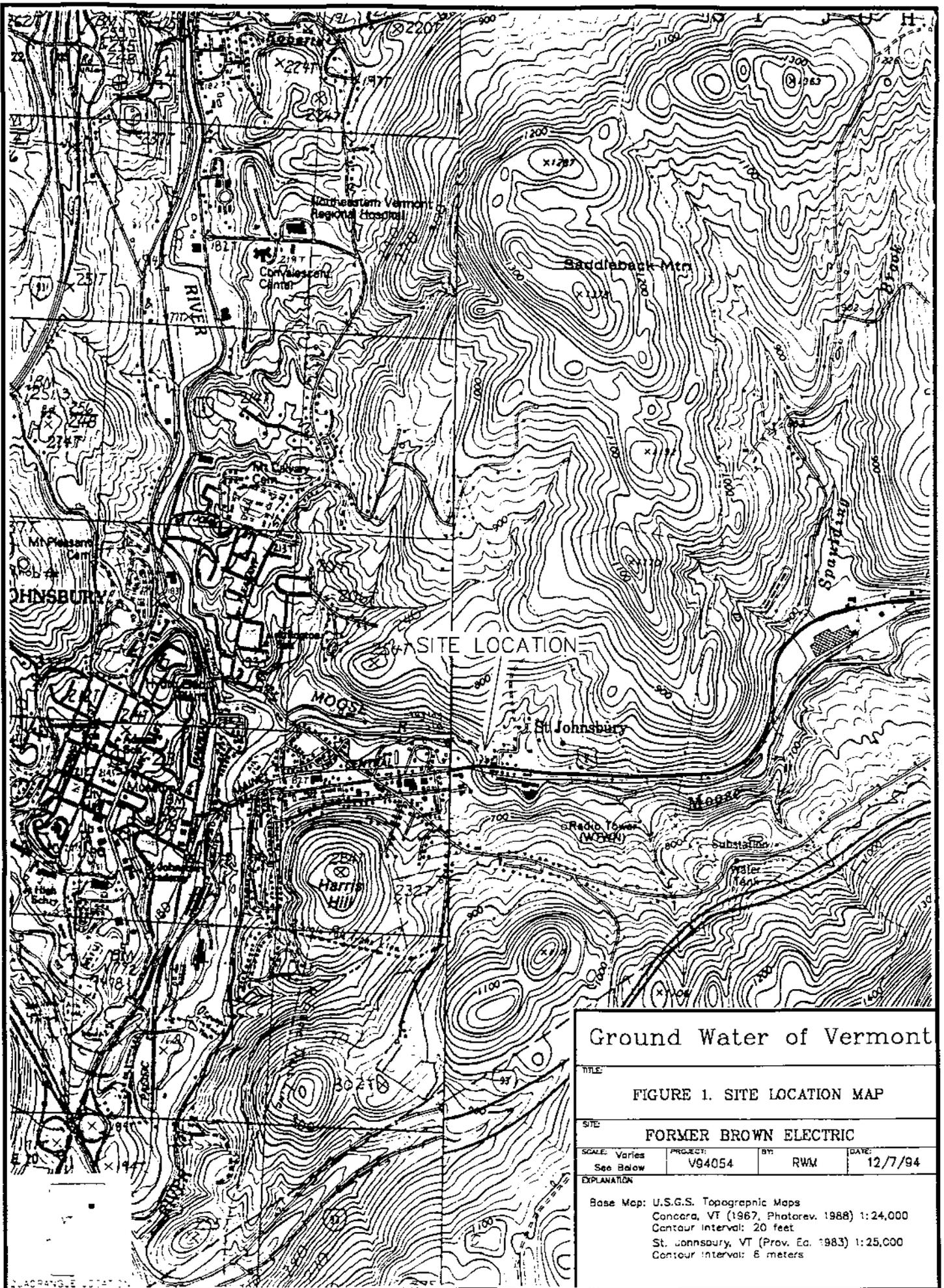
9. Ground water in the immediate vicinity of the monitoring wells was measured at 6 to 12.5 feet below ground surface and was flowing toward the west at a gradient of approximately 14%.
10. Soils at the site consisted of sand and gravel from the surface to a depth of 8 feet, underlain by fine sand and silt. Bedrock was encountered in the two downgradient borings at the site, at approximate depths of 16 to 17 feet below ground surface.

## 6.0 RECOMMENDATIONS

On the basis of the findings reached during this investigation, Ground Water of Vermont makes the following recommendations:

1. The on-site monitoring wells should be sampled and analyzed for petroleum compounds quarterly for one year. If ground water contaminant concentrations remain below Vermont ground water enforcement standards, the site should be considered for Site Management Activity Completed (SMAC) designation by the VT DEC.

**APPENDIX A**  
**FIGURES AND TABLES**



Ground Water of Vermont

TITLE

FIGURE 1. SITE LOCATION MAP

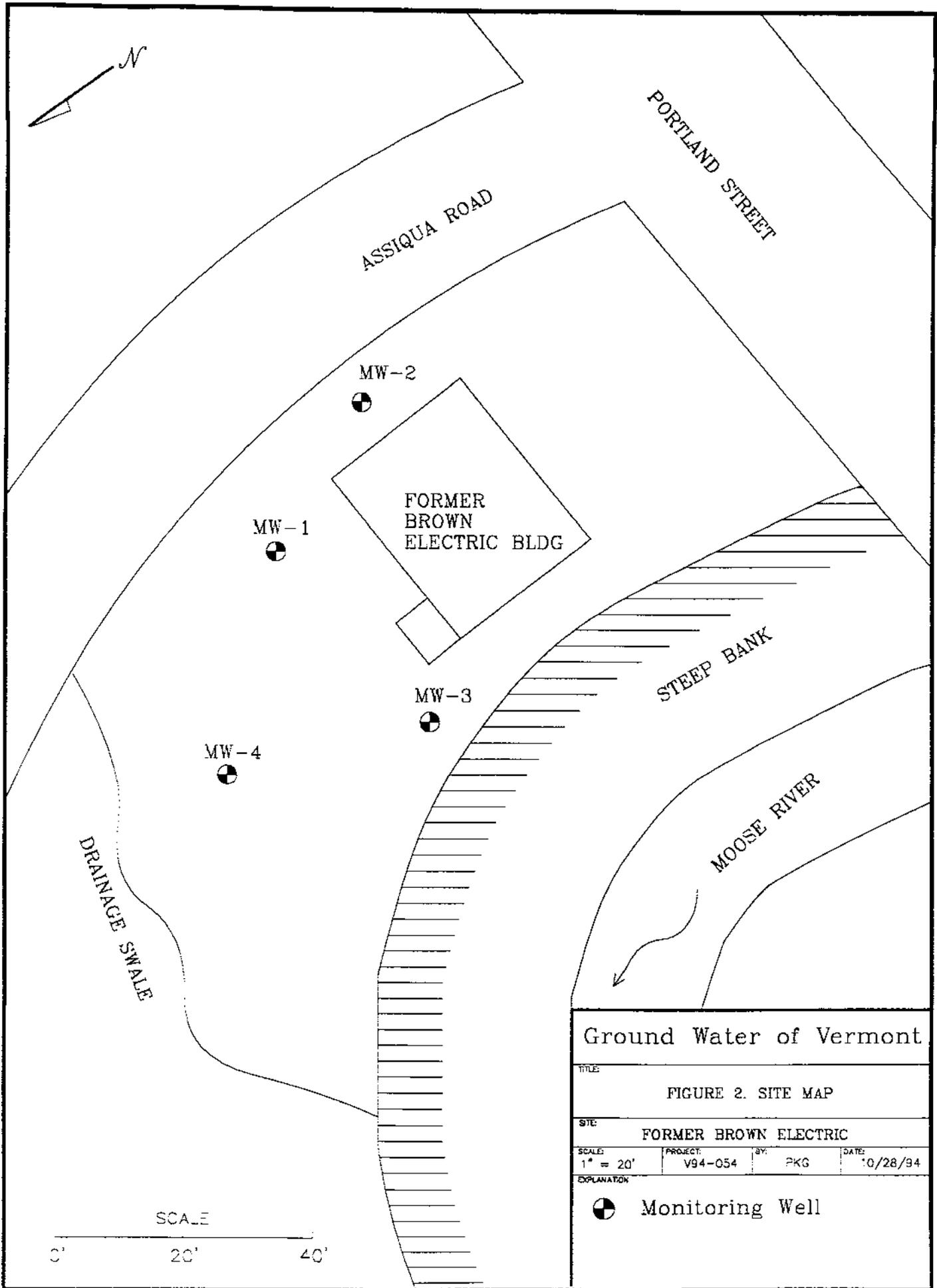
SITE

FORMER BROWN ELECTRIC

SCALE: Varies PROJECT: V84054 BY: RWM DATE: 12/7/94  
See Below

EXPLANATION

Base Map: U.S.G.S. Topographic Maps  
Concord, VT (1967, Photorev. 1988) 1:24,000  
Contour Interval: 20 feet  
St. Johnsbury, VT (Prov. Ed. 1983) 1:25,000  
Contour Interval: 6 meters



Ground Water of Vermont

TITLE:

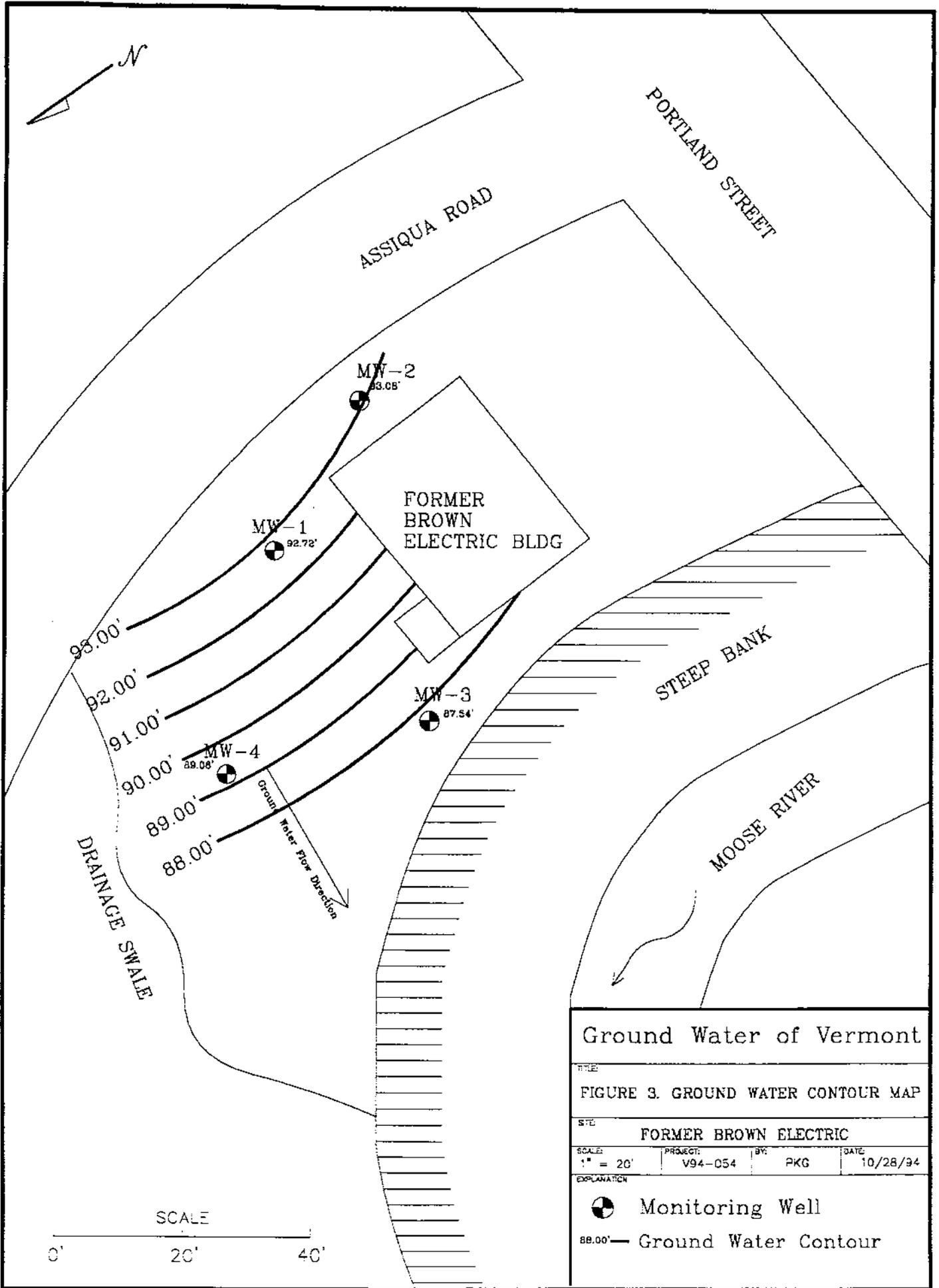
FIGURE 2. SITE MAP

SITE: FORMER BROWN ELECTRIC

SCALE: 1" = 20'	PROJECT: V94-054	BY: PKG	DATE: 10/28/94
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EXPLANATION

● Monitoring Well



Ground Water of Vermont			
TITLE:			
FIGURE 3. GROUND WATER CONTOUR MAP			
SITE:			
FORMER BROWN ELECTRIC			
SCALE:	PROJECT:	BY:	DATE:
1" = 20'	V94-054	PKG	10/28/94
EXPLANATION			
	Monitoring Well		
	88.00' — Ground Water Contour		

**TABLE 1. Soil Screening Results**

**Former Brown Electric  
St. Johnsbury, Vermont  
Monitoring Date: 20 Sept. and 14 Oct. 1994**

<b>LOCATION</b>	<b>DEPTH (FEET)</b>	<b>BACKGROUND (ppm)</b>	<b>RESPONSE (ppm)</b>
<b>MW-1</b>	9	0.0	26.8
	5-10	5.3	16.4
	5-10	1.2	130.0
	5-10	0.8	28.2
<b>MW-2</b>	2-4	0.0	5.9
	6-8	0.0	10.0
	9.5-11.5	0.0	3.8
<b>MW-3</b>	2-4	0.0	8.4
	6-8	0.0	7.0
	10-12	0.0	7.2
	15-17	0.0	6.2
<b>MW-4</b>	2-4	0.0	9.3
	5-7	0.0	10.1
	10-12	0.0	9.7
	15-16	0.0	6.3

**Note:** PID screening conducted by headspace method, using Photovac TIP II PID. PID was calibrated with 100 ppm isobutylene to a benzene reference.

Ref:94054T01

## Table 2. Liquid Level Calculations

Former Brown Electric  
St. Johnsbury, Vermont  
Monitoring Date: 24 October 1994

Well I.D.	Top of Casing Elevation	Depth to Ground Water	Ground Water Elevation
MW-1	99.08	6.36	92.72
MW-2	99.40	6.32	93.08
MW-3	100.00	12.46	87.54
MW-4	99.44	10.38	89.06

All values reported in feet, arbitrary datum

Ref:94054T02.wk4

**TABLE 3. GROUND WATER ANALYTICAL RESULTS**  
**Former Brown Electric**  
**St. Johnsbury, Vermont**

**Monitoring Date: 24 October 1994**

Station	Date	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	MTBE	TPH
MW-1	10/24/94	BPQL<1	BPQL<1	BPQL<1	BPQL<3	BPQL	BPQL<1	BPQL<1
MW-2	10/24/94	BPQL<1	BPQL<1	BPQL<1	BPQL<3	BPQL	BPQL<1	BPQL<1
MW-3	10/24/94	BPQL<1	BPQL<1	BPQL<1	BPQL<3	BPQL	BPQL<1	BPQL<1
MW-4	10/24/94	BPQL<1	BPQL<1	BPQL<1	BPQL<3	BPQL	BPQL<1	BPQL<1
MW-1 (DUP)	10/24/94	BPQL<1	BPQL<1	BPQL<1	BPQL<3	BPQL	BPQL<1	BPQL<1
EQUIPMENT BLANK	10/24/94	BPQL<1	BPQL<1	BPQL<1	BPQL<3	BPQL	BPQL<1	BPQL<1
TRIP BLANK	10/24/94	BPQL<1	BPQL<1	BPQL<1	BPQL<3	BPQL	BPQL<1	BPQL<1
VT DRINKING WATER STD.	--	5	1,000	700	10,000	--	40	--

Notes: BTEX and MTBE Reported in Parts Per Billion (ppb)  
 TPH Results Reported in Parts Per Million (ppm)  
 BPQL <1 = Below Practical Quantitation Limit of 1 (ppb or ppm)

Ref:94054t03.wk4

**APPENDIX B**  
**BORING LOGS**



# Ground Water of Vermont

FIELD SUPERVISOR **PARMINDER BIREWAL**  
 CONTRACTOR **TRI-STATE DRILLING & BORING**  
 DRILLERS

JOB LOCATION **BROWN ELECTRIC**  
**ST. JOHNSBURY, VT**  
 DATE **12/14**

DRILLING METHOD  
**HOLLOW STEM AUGER**  
 BORING DIAMETER

AND 40 - 50%  
 SOME 10 - 40%  
 TRACE 0 - 10%

BORING LOCATION BORING # **MW-3**  
 sketch on back or on-site plus  
 with measurements TOTAL DEPTH **17'**

DEPTH	SAMPLES	SAMPLE NUMBER	BLOWS PER 6"				REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL		DEPTH
			0	6	12	18					24		
1													1
2													2
3	↑		6	14	33	33		brown, coarse sand & gravel		moist, no odor	BENTONITE	BENTONITE	3
4	↓												4
5													5
6													6
7	↑		3	2	2	3		brown coarse sand & gravel		moist, no odor			7
8	↓												8
9													9
10													10
11	↑		1	2	1	2		brown fine sand and silt, some gray clay lenses		v. moist, no odor	SAND	SAND	11
12	↓												12
13													13
14													14
15													15
16	↑		7	10	6	7		gray-black, fine silt, sand, weathered bedrock		wet	SCREEN	SCREEN	16
17	↓												17
20													20
25													25
30													30
35													35
40													40

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN			GROUT		
SLOT SIZE			BACKFILL		
RISER PIPE			WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					



# Ground Water of Vermont

FIELD SUPERVISOR FARMNER GRENAL  
 CONTRACTOR TRI-STATE DRILLING & BORING  
 DRILLERS

JOB LOCATION PORTLAND ST  
ST. JOHNSBURY, VT  
 DATE 12/94

DRILLING METHOD  
HOLLOW STEM ANGER

BORING DIAMETER

AND 40 - 50%  
 SOME 10 - 40%  
 TRACE 0 - 10%

BORING LOCATION BORING # MW-2  
 sketch on back or on-site plan  
 with measurements TOTAL DEPTH 12'

DEPTH	SAMPLES	SAMPLE NUMBER	BLOWS PER 6"				REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL			DEPTH
			0-6	6-12	12-18	18-24					BENTONITE	SCREEN	SAND	
1														1
2														2
3	↑		2	2	4	2		brown coarse sand & gravel		moist, no odor				3
4	↓													4
5'														5'
6														6
7	↑		5	5	6	7		brown sand & gravel		very moist, no odor				7
8	↓													8
9														9
10'	↑		1	2	3	6		brown fine sand & silt, some clay lenses		wet, no odor				10'
11	↓													11
12														12
15'														15'
20'														20'
25'														25'
30'														30'
35'														35'
40'														40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN			GROUT		
SLOT SIZE			BACKFILL		
RISER PIPE			WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					



# Ground Water of Vermont

FIELD SUPERVISOR REMINDER GRENAL  
 CONTRACTOR TRI-STATE DRILLING & BORING  
 DRILLERS

JOB LOCATION BROWN ELECTRIC  
ST. JOHNSBURY, VT  
 DATE 12/94

DRILLING METHOD  
HOLLOW STEM AUGER

BORING DIAMETER

AND 40 - 50%  
 SOME 10 - 40%  
 TRACE 0 - 10%

BORING LOCATION

BORING #

sketch on back or on-site plan  
 with measurements

TOTAL DEPTH

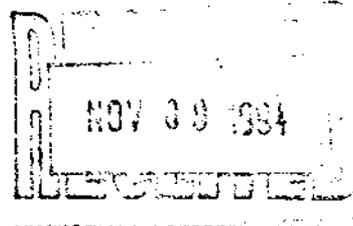
MW-3  
15'

DEPTH	SAMPLES	SAMPLE NUMBER	BLOWS PER 6"				
			0-6	6-12	12-18	18-24	24+
1							
2							
3	↑						
4	↓						
5'							
6	↑						
7	↓						
8							
9							
10'							
11	↑						
12	↓						
13							
14							
15'							
16	↓						
20'							
25'							
30'							
35'							
40'							

REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL	DEPTH
				BENTONITE	1
					2
					3
	brown coarse sand & gravel trace fine sand		moist, no odor		4
					5
					6
	brown sand & gravel		moist, no odor		7
					8
					9
					10
	brown sand & gravel		moist, no odor		11
					12
					13
					14
					15
	brown sands silt, some refusal gravel		Wet, no odor		16
					20'
					25'
					30'
					35'
					40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN			GROUT		
SLOT SIZE			BACKFILL		
RISER PIPE			WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					

**APPENDIX C**  
**LABORATORY REPORT FORMS**



## LABORATORY ANALYSIS

CLIENT NAME:	Groundwater of Vermont	REF #:	10048
ADDRESS:	One Mill Street Box C-5 Burlington, VT 05401	PROJECT NO.:	V94-054
SAMPLE LOCATION:	Former Brown Electric	DATE OF SAMPLE:	10/24/94
SAMPLER:	Brian Starer	DATE OF RECEIPT:	10/24/94
		DATE OF ANALYSIS:	11/3,11/4,11/5,11/6/94
ATTENTION:	Ron Miller	DATE OF REPORT:	11/7/94

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCl. The trip blank was supplied by the laboratory.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing calibration standards were monitored at intervals indicated in the specified method. The resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Brendan McMahon, Ph.D.  
Director, Chemical Services



## LABORATORY REPORT

### EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	Groundwater of Vermont	PROJECT CODE:	V94-094
PROJECT NAME:	Former Brown Electric	MAV REF.#:	10,048
REPORT DATE:	November 7, 1994	STATION:	MW-1
DATE SAMPLED:	October 24, 1994	TIME SAMPLED:	12:00
DATE RECEIVED:	October 24, 1994	SAMPLER:	Brian Starer
ANALYSIS DATE:	November 4, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
m+p-Xylene	2	BPQL
o-Xylene	1	BPQL
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 102%

BPQL = Below Practical Quantitation Limit (PQL).



## LABORATORY REPORT

### EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	Groundwater of Vermont	PROJECT CODE:	V94-094
PROJECT NAME:	Former Brown Electric	MAV REF.#:	10,048
REPORT DATE:	November 7, 1994	STATION:	MW-2
DATE SAMPLED:	October 24, 1994	TIME SAMPLED:	11:00
DATE RECEIVED:	October 24, 1994	SAMPLER:	Brian Starer
ANALYSIS DATE:	November 5, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL ( $\mu\text{g/L}$ )	Conc. ( $\mu\text{g/L}$ )
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
m+p-Xylene	2	BPQL
o-Xylene	1	BPQL
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 102%

BPQL = Below Practical Quantitation Limit (PQL).



## LABORATORY REPORT

### EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	Groundwater of Vermont	PROJECT CODE:	V94-094
PROJECT NAME:	Former Brown Electric	MAV REF.#:	10,048
REPORT DATE:	November 7, 1994	STATION:	MW-3
DATE SAMPLED:	October 24, 1994	TIME SAMPLED:	10:15
DATE RECEIVED:	October 24, 1994	SAMPLER:	Brian Starer
ANALYSIS DATE:	November 5, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
m+p-Xylene	2	BPQL
o-Xylene	1	BPQL
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 102%

BPQL = Below Practical Quantitation Limit (PQL).



## LABORATORY REPORT

### EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	Groundwater of Vermont	PROJECT CODE:	V94-094
PROJECT NAME:	Former Brown Electric	MAV REF.#:	10,048
REPORT DATE:	November 7, 1994	STATION:	MW-4
DATE SAMPLED:	October 24, 1994	TIME SAMPLED:	09:45
DATE RECEIVED:	October 24, 1994	SAMPLER:	Brian Starer
ANALYSIS DATE:	November 6, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
m+p-Xylene	2	BPQL
o-Xylene	1	BPQL
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 102%

BPQL = Below Practical Quantitation Limit (PQL).



## LABORATORY REPORT

### EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	Groundwater of Vermont	PROJECT CODE:	V94-094
PROJECT NAME:	Former Brown Electric	MAV REF.#:	10,048
REPORT DATE:	November 7, 1994	STATION:	Duplicate
DATE SAMPLED:	October 24, 1994	TIME SAMPLED:	not given
DATE RECEIVED:	October 24, 1994	SAMPLER:	Brian Starer
ANALYSIS DATE:	November 5, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
m+p-Xylene	2	BPQL
o-Xylene	1	BPQL
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 102%

BPQL = Below Practical Quantitation Limit (PQL).



## LABORATORY REPORT

### EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	Groundwater of Vermont	PROJECT CODE:	V94-094
PROJECT NAME:	Former Brown Electric	MAV REF.#:	10,048
REPORT DATE:	November 7, 1994	STATION:	Field Blank
DATE SAMPLED:	October 24, 1994	TIME SAMPLED:	09:45
DATE RECEIVED:	October 24, 1994	SAMPLER:	Brian Starer
ANALYSIS DATE:	November 4, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
m+p-Xylene	2	BPQL
o-Xylene	1	BPQL
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 102%

BPQL = Below Practical Quantitation Limit (PQL).



## LABORATORY REPORT

### EPA METHOD 8020 ANALYTES + MTBE with GC/MS Confirmation

CLIENT NAME:	Groundwater of Vermont	PROJECT CODE:	V94-094
PROJECT NAME:	Former Brown Electric	MAV REF.#:	10,048
REPORT DATE:	November 7, 1994	STATION:	Trip Blank
DATE SAMPLED:	October 24, 1994	TIME SAMPLED:	09:30
DATE RECEIVED:	October 24, 1994	SAMPLER:	Brian Starer
ANALYSIS DATE:	November 3, 1994	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	BPQL
Toluene	1	BPQL
Ethylbenzene	1	BPQL
m+p-Xylene	2	BPQL
o-Xylene	1	BPQL
Chlorobenzene	1	BPQL
1,2-Dichlorobenzene	1	BPQL
1,3-Dichlorobenzene	1	BPQL
1,4-Dichlorobenzene	1	BPQL
MTBE	1	BPQL

Surrogate % Recovery: 102%

BPQL = Below Practical Quantitation Limit (PQL).



## LABORATORY ANALYSIS

CLIENT NAME:	Groundwater of Vermont	REF #:	10048
ADDRESS:	One Mill Street Box C-5 Burlington, VT 05401	PROJECT NO.:	V94-054
SAMPLE LOCATION:	Former Brown Electric	DATE OF SAMPLE:	10/24/94
SAMPLER:	Brian Starer	DATE OF RECEIPT:	10/24/94
		DATE OF ANALYSIS:	11/7/94
ATTENTION:	Ron Miller	DATE OF REPORT:	11/10/94

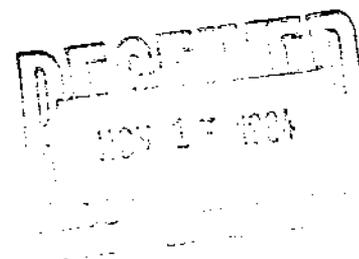
### TOTAL PETROLEUM HYDROCARBONS EPA Method 418.1

Sample	PQL	TPH in mg/L
MW-1	1	BPQL
MW-2	1	BPQL
MW-3	1	BPQL
MW-4	1	BPQL
Duplicate	1	BPQL
Field Blank	1	BPQL
Trip Blank	1	BPQL

BPQL = Below Practical Quantitation Limit

Reviewed by:

Brendan McMahon, Ph.D.  
Director, Chemical Services





# Groundwater of Vermont

The Chace Mill, One Mill Street, Box C-5, Burlington, Vermont, 05401  
(802)-860-6065 (802)-860-6076 Fax

NO PPT  
10/15

21 10/14 ✓

## CHAIN OF CUSTODY RECORD

LABORATORY

PROJECT NUMBER: V94-054  
PROJECT NAME: Former Brown Electric  
PROJECT LOCATION: St Johnsbury, VT  
PROJECT MANAGER: Pam Miller  
COLLECTED BY: Brian Storer  
DATE: 10/24/94

ANALYSIS STATUS:

RUSH (2-DAY)  
 PRIORITY (4-DAY)  
 BEST AVAILABLE TIME

### ANALYSIS REQUESTED

METALS - PLEASE USE: MA ( ) ENTOX ( ) (P) MTGP ( )  
 OL & GREASE: IR ( ) GRAY ( )  
 VOLATILE ORGANICS: 521 ( ) 501 ( ) 502 ( ) 503 ( )  
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10048

SAMPLE ID	DATE	TIME	SAMPLE MATRIX	TYPE OF CONTAINER	# CONT.	PRESRV	METALS	OL & GREASE	VOLATILE ORGANICS	EXTRACTABLES	TSS	BACTERIAL	CYANIDE	CL	NO3	TCDF	OTHER	REMARKS
MW-1	10/24	12:00P	W	VOA + 1L Amber	3	I/A			X								X	
MW-2		11:00A							X								X	
MW-3		10:15A							X								X	
MW-4		9:45A							X								X	
Duplicate		-							X								X	
Field Blank		9:00A							X								X	
Trip Blank		9:30A							X								X	

TPH 418.1

### MATRIX

W = AQUEOUS  
S = SOLIDS

### PRESERVATIVE

I = ICED  
A = ACIDIFIED (1L Amber - 1.1 HCl 40 drops)  
B = BASE  
N = SODIUM BISULFATE

RELINQUISHED BY

*[Signature]*

DATE

10/24/94

TIME

1:40

RECEIVED BY

*[Signature]*